

Maine EMS



Paramedic
Interfacility Transfer
Module

August 2003

PARAMEDIC INTERFACILITY TRANSFER MODULE

for

PARAMEDIC TRANSFER SERVICES

Introduction

This program was developed in response to an identified need to expand the capabilities of paramedic services, specifically in the area of interfacility transport. The course is designed to be supplemental education for paramedics. The instructor will be the Regional Medical Director or their designee. Services interested in utilizing the paramedic skills taught in this module must work with the Regional EMS office to establish an acceptable QA program and must have the service approved for these skills by the Regional Medical Director.

The initial decision to transfer a patient utilizing paramedics trained at this level is the decision of the hospital nursing staff, the attending physician, and the paramedic service. However, the final decision rests with the transferring paramedic as to whether or not they feel comfortable transporting the patient without additional hospital nursing staff.

The didactic and practical objectives for the program are listed in this lesson plan. The didactic objectives should be accomplished in the classroom using the attached outline as a guide. The practical objectives should be accomplished to the satisfaction of the instructor, either through field experience, classroom/practical time, or in-hospital clinical rotations. There will be a written exam at the end of the program; a participant must score 80% or better for successful completion of the course.

It is the service's responsibility to assure that the paramedics involved in such a transfer are adequately trained in the specific pumps used by the service.

PARAMEDIC INTERFACILITY TRANSFER MODULE

for

PARAMEDIC TRANSFER SERVICES

Didactic

Upon successful completion of this program the student will be able to:

1. Define the following pharmacological terms:

| | | |
|--------------------|-------------------|-----------------|
| Antagonism | Synergism | Bolus |
| Therapeutic Action | Cumulative Action | Tolerance |
| Hypersensitivity | Untoward Effect | Idiosyncrasy |
| Parenteral | Pharmacokinetics | Potentialiation |
| Pharmacodynamics | Refractory | |
2. List the four names for a drug.
3. Describe the Autonomic nervous system and its role in pharmacology.
4. Describe the mechanism of action, indications for use, contraindications, dosage, adverse reactions, and precautions of the following medications:

| | | |
|-------------|------------------------|---|
| Vitamins | Dobutamine | Glycoprotein IIb/IIIa Platelet Inhibitors |
| Potassium | Heparin | Lorazepam (Ativan) |
| Morphine | Nitroglycerine | Antibiotics |
| Haloperidol | Midazolam | Procainamide |
| Diltiazem | Insulin | Total Parenteral Nutrition (TPN) |
| H2 Blockers | Proton Pump Inhibitors | Somatostatin Analogues |
5. List the names and types of medication pumps that your service will be using when transporting patients.

Practical

1. Demonstrate the following:

| | |
|---------------------|------------------------------|
| Turning pump on/off | Setting up the pump |
| Set drip rates | Troubleshooting the pump |
| Resetting the pump | Correct operating procedures |
2. Demonstrate the correct procedures for treating adverse reactions to the following Medications:

| | | |
|-------------|------------------------|---|
| Vitamins | Dobutamine | Glycoprotein IIb/IIIa Platelet Inhibitors |
| Potassium | Heparin | Lorazepam (Ativan) |
| Morphine | Nitroglycerine | Antibiotics |
| Haloperidol | Midazolam | Procainamide |
| Diltiazem | Insulin | Total Parenteral Nutrition (TPN) |
| H2 Blockers | Proton Pump Inhibitors | Somatostatin Analogues |

PARAMEDIC INTERFACILITY TRANSFER MODULE
for
PARAMEDIC TRANSFER SERVICES
LESSON PLAN

I. Introduction, course overview

- A. The purpose of this program is to provide the additional training necessary to allow paramedics to transport patients that have Heparin, Nitroglycerin, Morphine, Dobutamine, Potassium, Vitamin IV, antibiotics, Class IIb/IIIa platelet inhibitors, Procainamide, Diltiazem, Insulin, TPN, H2 Blockers, Proton Pump Inhibitors, or Somatostatin Analogues infusions, thereby reducing reliance on hospital nursing staff for interfacility transfer. This program also provides training in the use of Lorazepam (Ativan), Haloperidol (Haldol), and Midazolam (Versed) IV bolus. This program focuses on parenteral medications administered by volumetric control devices.
- B. Paramedics must not transport unstable patients without necessary additional nursing staff. Paramedics will have the final say whether or not they feel comfortable transporting a particular patient without accompanying hospital-nursing staff.
- C. Services providing paramedics trained in this program must work closely with their Medical Director and their QI process to assure a high standard of care.
- D. Medical direction will be the responsibility of the sending facility. Medical orders for the transport shall be in writing. If the ambulance has traveled far enough so that it is no longer possible to get medical control from the sending facility, control should be sought from the receiving facility. If neither is possible, seek medical control from the closest appropriate facility.
- E. COBRA overview: COBRA requires that "... patient transfer is effected through qualified personnel and required transportation equipment. This includes the use of necessary and medically appropriate life support measures during transfer." Prehospital care providers must feel comfortable that their training and education qualifies them for the transfer.
- F. Explain how the practical portion of the program will be accomplished.

II. Terminology

| | |
|----------------------------|---|
| <i>Antagonism</i> - | signifies the opposition between two drugs |
| <i>Bolus</i> - | single, often large dose of medication |
| <i>Cumulative Action</i> - | occurs when a drug is administered in several doses, causing an increased effect. |
| <i>Hypersensitivity</i> - | is a state of altered reactivity to a foreign substance, with an exaggerated immune response. |
| <i>Idiosyncrasy</i> - | an individual reaction to a drug that is different from that usually seen. |

Terminology (cont.)

| | |
|-----------------------------|---|
| <i>Potentiation</i> - | enhancement of one drug's effects by another. |
| <i>Parenteral</i> - | entering the body through any route other than the digestive tract. (IV, SC, IM) |
| <i>Refractory</i> - | Patients who do not respond to a drug are said to be refractory. |
| <i>Synergism</i> - | is the combined action of two drugs |
| <i>Therapeutic Action</i> - | is the intended action of a drug given in the appropriate medical setting. |
| <i>Tolerance</i> - | when a patient requires increasingly larger doses to achieve a therapeutic effect. |
| <i>Untoward effect</i> - | side effect harmful to a patient |

III. Drug Names

- A. Drugs can be identified by four different names:

| | |
|-----------------|---|
| Chemical Name | identifies drug's chemical structure |
| Generic Name - | abbreviated version of the Chemical Name |
| Trade Name - | name given to drug by manufacturer |
| Official Name - | name as published in the U.S. Pharmacopoeia |

- B. An example of the above is:

| | |
|-----------------|--|
| Chemical Name - | I ,2-benzenediol, 4-(2-aminoethyl)-, hydrochloride |
| Generic Name - | Dopamine hydrochloride |
| Trade Name - | Intropin |
| Official Name - | Dopamine hydrochloride ₁ USP |

IV. Actions of Drugs

- A. Pharmacokinetics - The study of how drugs enter the body, reach their site of action, and how they are eventually eliminated. Several factors influence the concentration of a drug in the body:
Absorption; Distribution; Biotransformation; Elimination
- B. Pharmacodynamics - The study of a drug's action upon the body.
- C. Therapeutic Index - The difference between effective and toxic concentrations.

V. Autonomic Nervous System, review

- A. Nervous system has two major subdivisions:
1. Central nervous system
 2. Peripheral nervous system
- B. The autonomic nervous system is that part of the peripheral nervous system that controls the body's involuntary functions. (i.e. arterial blood pressure, cardiac function, body temperature)

Autonomic Nervous System, Review (Cont.)

- C. Neurotransmitter is a chemical substance released by the neuron to act on the target cell to either excite or inhibit it.
- D. Two functional divisions of the autonomic nervous system:
 - 1. Sympathetic nervous system - allows the body to function under stress - *Fight or Flight*.
 - a. Epinephrine and norepinephrine are the major neurotransmitters for the sympathetic nervous system.
 - b. Sympathomimetics (adrenergic) - drugs that stimulate the sympathetic nervous system. (epinephrine)
 - c. Sympatholytics (antiadrenergic) - drugs that inhibit the sympathetic nervous system. (Inderal)
 - 2. Parasympathetic nervous system - primarily controls vegetative functions and is an antagonist to the sympathetic nervous system.
 - a. Acetylcholine is the neurotransmitter for the parasympathetic nervous system.
 - b. Parasympathomimetics (cholinergic) - drugs that stimulate the parasympathetic nervous system. (Prostigmine)
 - c. Parasympatholytics (anticholinergic) - drugs that block the actions of the parasympathetic nervous system. (Atropine)

VI. Medications

A. Morphine

Mechanism of Action

Morphine is an opiate derivative that is a powerful CNS depressant that decreases preload, thereby reducing the heart's oxygen requirement and relieving lung congestion. Morphine is a controlled substance with schedule II classification.

Indications

Severe pain associated with MI, kidney stones, fractures, Pulmonary Edema

Contraindications -

Hypotension

Hypersensitivity history

Head Injury

Undiagnosed abdominal pain

Dosage

2-5mg IV bolus

IV Drip varies with patient

Morphine (cont.)

Adverse reactions

Respiratory depression, sedation, confusion, hypotension, bradycardia, nausea/vomiting.

Precautions

Morphine less likely to cause serious respiratory depression when given slowly in small doses; Naloxone should always be available when Morphine being given; vital signs should be monitored consistent with patients condition.

Transport Checklist

Check the IV site – patency, redness etc.

IV fluids / medications running into the same site

Check for a copy of the order for the Morphine

Check concentration

Check the dose

Why was the drip started?

When was the drip started?

Last time the drip was titrated & why?

B. Dobutamine

Mechanism of Action

Dobutamine is a synthetic catecholamine that increases cardiac contractility and stroke volume with relatively little effect on the heart rate or blood vessels.

Dobutamine acts primarily on Beta receptors but is less of a Beta agonist than Isuprel and increases systolic contractions (inotropic effect)

Indications

Short-term management of congestive heart failure when increased cardiac output is desired without increasing rate.

Contraindications

Bradycardia; should not be used as the sole agent in hypovolemic shock

Dosage

2.5 - 10 mcg/kg/minute - mixed either 250mg Dobutamine in 500 ml d5w to make concentration of 500 mcg/ml-or- 500 mg Dobutamine in 250 ml d5w to make concentration of 2 mg/ml (2000 mcg/ml)

Adverse reactions

Headache, tachycardia, hypertension, PVC's, chest pain, shortness of breath, nausea/vomiting

Precautions

Dobutamine should be used with caution in patients who may be experiencing a MI because it may aggravate or extend infarct size. A 10-20 mm hg rise in BP and

Dobutamine (cont.)

5 - 15 rise in heart rate is normal. The hypertensive potential of Dobutamine may be enhanced by presence of Tricyclic anti depressants. Vital Signs monitored consistent with patient's condition.

Transport Checklist

Check the IV site – patency, redness etc.

IV fluids / medications running into the same site

Check for a copy of the order for the Dobutamine

Check concentration

Check the dose

Why was the drip started?

When was the drip started?

Last time the drip was titrated & why?

Incompatible with the following medications if given via same IV line:

Furosemide, Sodium Bicarb, Potassium

Compatible with:

Dopamine, Lidocaine, Potassium

C. Heparin

Mechanism of action

Accelerates formation of antithrombin III ; inactivates thrombin and prevents conversion of fibrinogen to fibrin, thereby inhibiting the clotting process. **Review clotting process.**

Indications

Deep vein thrombosis

Myocardial infarction

Frostbite

Contraindications

Active bleeding

Bleeding disorders

Dosage

5,000-7,500 units IV Bolus then 1,000 units/hour by IV infusion pump.

Adverse reactions

Increased or uncontrolled bleeding

Precautions

Watch for signs of increased bleeding, vital signs monitored consistent with patient's condition.

Heparin (cont.)

Transport Checklist

Check the IV site – patency, redness etc.
IV fluids / medications running into the same site
Check for a copy of the order for the Heparin
Check concentration
Check the dose
Why was the drip started?
When was the drip started?

Last time the drip was titrated & why?
Signs & symptoms of any bleeding?
Avoid unnecessary IV sticks

Incompatible with the following medications if given via same IV line:

Diazepam (Valium)

D. Nitroglycerine

Mechanism of action

Nitroglycerin is a rapid smooth muscle relaxant that reduces cardiac oxygen demand by decreasing left ventricular end diastolic pressure (preload), and, to a lesser extent, systemic vascular resistance (afterload). Increases blood flow through coronary vessels.

Indications

Chest pain associated with Angina Pectoris
Congestive Heart Failure
Pulmonary edema

Contraindications

Hypersensitivity
Increased intracranial pressure
Hypotension

Dosage

.3-.4mg sublingual
Normal starting dose 10 -20 mcg/min IV infusion, Titrated to effect

Adverse reactions

Headache, dizziness, weakness, hypotension, tachycardia, nausea/vomiting

Precautions

Monitor patients BP regularly, watch for hypotension. Nitroglycerine may produce additive hypotensive effects with patients taking Beta-adrenergic blockers and Calcium channel blockers. Severe hypotension may require IV fluid replacement. Vital Signs minimum every 5 minutes

Nitroglycerine (cont.)

Transport Checklist

Check the IV site – patency, redness etc.

IV fluids / medications running into the same site

Check for a copy of the order for the NTG

Check concentration

Check the dose

Why was the drip started?

When was the drip started?

Last time the drip was titrated & why?

Beware of Orthostatic Hypotension with Calcium channel blockers

Ask about Viagra use!

Headache can be relieved with analgesics

E. Potassium

Mechanism of Action

Replaces/ Maintains potassium level

Indications

Hypokalemia when oral replacement is not feasible

Contraindications

Severe renal impairment, dehydration,

Dosage

Variable, up to 20 mEq per hour

Adverse Reactions

Cardiac Dysrhythmias (hyperkalemia).

Heart Block; prolonged P-R interval; wide QRS; ST depression; tall, tented T-waves

Precautions

Patients should be on cardiac monitor during transport

Transport Checklist

Check the IV site – patency, redness etc.

IV fluids / medications running into the same site

Check for a copy of the order for the Potassium

Check concentration

Check the dose

Why was the drip started?

When was the drip started?

When was the last Potassium level done & value (Norm 4 – 5.4 mEq /L)?

Replacement Therapy

PIV - maximum concentration 10 mEq / 100 cc every hour

Potassium (cont.)

Central Line – maximum concentration 20 mEq / 50 cc

Aware of any illness/injury causing retention of potassium?

Incompatible with the following medication if given via same IV line:

Diazepam (Valium)

F. Vitamins

Mechanism of Action

Source of vitamins essential for the normal metabolism, growth, and development of the body.

Indications

Prevention of vitamin deficiencies in patients with inadequate diets or increased daily requirements.

Contraindications

Hypersensitivity

Dosages

Depends on nature and severity of deficiency

Adverse reactions

Allergic reactions, including anaphylaxis, may occur in patients with hypersensitivity.

Precautions

Toxicity from fat-soluble vitamins (A & D)

G. Glycoprotein IIb/IIIa platelet inhibitors

Indications

GP IIb/IIIa inhibitors are used to inhibit platelet function in patients with Coronary Artery Disease. GP IIb/IIIa inhibitors, in combination with Heparin, are indicated for the treatment with acute coronary syndrome, including those patients who are to be managed medically and those undergoing PTCA or arterectomy.

Action

GP IIb/IIIa inhibitors inhibit fibrinogen binding to platelets. Binding of fibrinogen to the platelet is the final common pathway involved in platelet aggregation. Platelet aggregation inhibition is reversible following the cessation of the administration of GP IIb/IIIa inhibitors.

Dosage and Administration

1. A two-staged IV infusion is usually used for administration. The dosage varies among drugs and will be determined by the sending physician.

Glycoprotein IIb/IIIa platelet inhibitors (cont.)

2. GP IIb/IIIa inhibitors have a half-life of approximately 2 hours.
3. The sending Physician/RN will have set the infusion prior to arrival of the Paramedic. The paramedic must check the infusion rate/dose against physician orders prior to beginning transport. In patients with severe renal insufficiency, the dose should be reduced.
4. No filter is needed for the infusion. Heparin can be infused at the same IV site.

Considerations-

No reports of allergic reactions were documented in clinical trials. However, the patient should still be monitored for signs and symptoms of anaphylaxis and allergy.

1. Bleeding is the most common complication encountered during therapy, so the patient should be monitored for signs and symptoms of bleeding. Avoid unnecessary IV sticks.
2. Risk of bleeding is reduced when Heparin is given in weight-adjusted doses.
3. Bleeding time is normalized 3 – 4 hours after discontinuation of IIb/IIIa inhibitors.

Contraindications -

IIb/IIIa inhibitors are contraindicated in the following patients:

1. Known hypersensitivity to any component of the product.
2. Active internal bleeding or history of bleeding diathesis within the prior 30 days.
3. History of intracranial hemorrhage, intracranial neoplasm, AV malformation or aneurysm.
4. History of thrombocytopenia following prior exposure to the drug.
5. Major surgical procedure or severe physical trauma within the previous month.
6. History of symptoms, or findings suggestive of, aortic dissection.
7. Severe hypertension (SBP > 180mm hg and/or diastolic > 110mm hg).
8. Acute Pericarditis.
9. Concomitant use of another parenteral GP IIb/IIIa inhibitor.
10. History of a stroke within 30 days or any history of hemorrhagic stroke.

Transport Considerations

Check the IV site – patency, redness etc.

IV fluids / medications running into the same site

Check for a copy of the order for the IIb / IIIa medication

Check concentration

Check the dose

Why was the drip started?
When was the drip started?
Last time the drip was titrated & why?
Signs & symptoms of any bleeding?
Avoid unnecessary IV sticks!

Incompatible with the following medication if given via same IV line:

Diazepam (Valium)

H. Lorazepam (Ativan)

Indications

To produce sedation and relieve anxiety

Action

Lorazepam is a benzodiazepine CNS depressant that is metabolized and excreted in urine. May cause respiratory depression.

Dosage and Administration

Lorazepam (Ativan) administered during interfacility transport will be given IV bolus only as prescribed by the sending physician. Lorazepam (Ativan) drips are **not authorized** for transport under the interfacility transport program unless accompanied by a nurse.

Considerations

Flumazenil to reverse effect (not carried by EMS crews)
Monitor for respiratory depression.
May require reduced dose for impaired renal function.
Monitor B/P and HR closely.

I. Anti-Infective Drugs

Indications

Used to treat infectious diseases

Action

Natural or synthetic substances that inhibit growth of or destroy microorganisms.

Classification

Three major classifications are antiviral, antifungal and antibacterial.

Antiviral - There are very few agents including Acyclovir, Famciclovir, Foscarnet and Ganciclovir. Delay during transport is acceptable with these and they should not be given in interfacility transport.

Antifungal - Amphotericin B is the most common intravenous antifungal drug. It is given once daily and should not be administered in interfacility transport.

Anti-Infective Drugs (cont.)

Antibacterials - This is a large group of drugs used to treat infection by bacteria. It includes a large variety of drugs with the most common being Penicillin's, Cephalosporins (Cefazolin, Ceftazidime, Ceftriaxone), and Aminoglycosides (Tobramycin & Gentamicin). It is appropriate in some clinical situations to give these during interfacility transport.

Adverse effects

Acute adverse effects are generally /allergic hypersensitivity reactions and phlebitis.

Allergy/hypersensitivity reactions commonly occur from start to 1 hour after administration of the first dose. Prehospital allergy/anaphylaxis protocol should be followed if this occurs.

Phlebitis can occur when the drug is too concentrated, given through a peripheral line, or given too quickly. Only antibiotics prepared in final dilution by the institution's pharmacy or clinical staff should be administered. Careful attention should be paid to the infusion device and rate during transport.

Physicians order

Transporting personnel must be sure that they have an order with the following information prior to transport:

- Antibiotic name
- dose
- dilution
- volume
- route of administration
- rate of administration

Preparation

Antimicrobial drugs should be prepared by the institution's pharmacy or clinical staff in final concentration ready to be administered without further manipulation.

Transport Checklist

- Check the IV site – patency, redness etc.
- IV fluids / medications running into the same site
- Check for a copy of the order for medication
- Check concentration
- Check the dose & dosing schedule
- Why is the medication being given?
- The first dose of any Anti-Infective Drug should be given in the hospital if possible
- The Aminoglycoside class (Gent, Tobramycin, Vancomycin) should be given slowly, usually over 1 hour – because of nephro toxicity

J. PROCAINAMIDE (PRONESTYL)

Class:

Antiarrhythmic

Mechanism of Action:

Procainamide is used to suppress ventricular ectopy. It is used when this ectopy is refractory to Lidocaine administration. Procainamide reduces automaticity in certain pacemaker cells within the heart. It will slow intraventricular passage of electrical responses to a greater extent than will Lidocaine.

Indications:

Procainamide is indicated for use when ventricular ectopy is refractory to Lidocaine treatment in ventricular tachycardia or fibrillation.

Contraindications:

Patients who demonstrate severe conduction disturbances such as second or third degree heart block are not candidates for procainamide administration.

Dosage:

Bolus Dose: 100 mg given at 20mg/min. over 5 minutes. The bolus dose should be discontinued if any of the following criteria are met:

1. The patient becomes hypotensive
2. The ectopy is suppressed
3. The QRS complex widens by more than 50% of its original width
4. The patient receives a total of 17 mg/kg of the medication

IV Drip Dose: Procainamide is administered in an IV infusion at a rate of from 1 to 4 mg/min. The length of procainamide's action is shorter than that of Lidocaine so the administration must be more rigorous. Procainamide is mixed as an infusion by placing 1 gram of the drug in 500 ml of D₅W. This mixture will yield a concentration of 2 mg/ml.

Adverse Reactions:

Hypotension, drowsiness, seizures, confusion, bradycardia, heart blocks, nausea and/or vomiting, or respiratory or cardiac arrest.

Precautions:

Any patient with ventricular ectopy in the presence of bradycardia should not receive procainamide until drug therapy or transcutaneous pacing has resolved the bradycardia. The hypotensive effects of procainamide may be enhanced in the presence of antihypertensive medications. Neurological toxicity increases when used in conjunction with Lidocaine.

Transport Considerations

Check the IV site – patency, redness etc.

IV fluids / medications running into the same site

Check for a copy of the order for Procainamide

PROCAINAMIDE (PRONESTYL)(CONT.)

Check concentration
Check the dose
Why was the drip started?
When was the drip started?
Last time the drip was titrated & why?

K. DILTIAZEM (CARDIZEM)

Class:
Calcium channel blocker

Mechanism of Action:

By blocking the uptake of calcium, Diltiazem slows conduction through the AV node and also causes dilation of the vascular bed. This helps to slow rapid ventricular rates in atrial fibrillation and atrial flutter. It is helpful in treating angina by creating a negative inotropic effect and causing dilation of the coronary arteries.

Indications:

Diltiazem is used to treat atrial fibrillation and flutter with a rapid ventricular response and PSVT that is refractory to adenosine. It may also be used in the treatment of angina pectoris.

Contraindications:

This drug is contraindicated in those patients in wide-complex ventricular tachycardias. It is imperative that this drug not be used for those patients with a history of Wolff-Parkinson-White syndrome. Diltiazem should not be used for patients who are hypotensive or in cardiogenic shock.

Dosage:

For rapid atrial fibrillation and flutter

Bolus Dose: 20mg IV bolus (0.25mg/kg) over 2 minutes followed by IV drip dose

IV Drip Dose: 125 mg of Diltiazem in 25 ml's is mixed with 100 ml's of D₅W to yield a concentration of 1 mg /ml. This concentration is then administered at a rate between 5 and 15 mg/hr.

For paroxysmal supraventricular tachycardia

Bolus Dose: 20mg IV bolus (0.25mg/kg) over 2 minutes followed by IV drip dose

Adverse Reactions:

Diltiazem may produce headache, nausea and/or vomiting, hypotension, and can precipitate bradycardia, heart block and asystole.

Precautions:

May cause systemic hypotension so constant blood pressure monitoring is essential. May interact with beta-blockers by increasing the risk of congestive heart failure, bradycardia, or asystole.

DILTIAZEM (CARDIZEM)(CONT.)

Transport Considerations

Check the IV site – patency, redness etc.
IV fluids / medications running into the same site
Check for a copy of the order for Diltiazem
Check concentration
Check the dose
Why was the drip started?
When was the drip started?
Last time the drip was titrated & why?

L. INSULIN (HUMULIN, NOVOLIN, ILETIN)

Class:

Hormone and antihyperglycemic

Mechanism of Action:

Insulin acts as a catalyst to promote the uptake of glucose by the cells of the body. This in turn will reduce blood serum glucose levels.

Indications:

Insulin should be administered in the presence of hyperglycemia, diabetic ketoacidosis, non-ketotic hyperosmolar coma, and in hyperkalemia.

Contraindications:

Insulin should not be administered in those patients without confirmation of blood serum glucose levels. These levels should be acquired by the use of a glucometer and should be verified as needed.

Dosage:

Infusion dosages for insulin are given at a rate of 0.1 units/kg/hr. Patient may also receive this medication by subcutaneous or intramuscular injection in a dose of anywhere between 5 and 20 units.

Adverse Reactions:

This drug, by its action may produce hypoglycemia. Allergic reactions may be seen in those patients receiving animal derivative insulin for the first time. Patients receiving corticosteroids may require higher doses, as these drugs tend to increase blood glucose levels.

Precautions:

Constant blood glucose monitoring is essential for appropriate patient care. The administration of dextrose may be necessary at any time.

Transport Considerations

Check the IV site – patency, redness etc.
IV fluids / medications running into the same site

INSULIN (HUMULIN, NOVOLIN, ILETIN)(CONT.)

Check for a copy of the order for the Insulin
Check concentration
Check the dose
Why was the drip started?
When was the drip started?
Last time the drip was titrated & why?

M. MIDAZOLAM (VERSED)

Class:
Sedative and Hypnotic

Mechanism of Action:

This drug is a potent benzodiazepine that is short acting. Versed is three to four times more potent than Diazepam and is used on a very regular basis. Onset of action is about 1.5 minutes when given intravenously and 15 minutes when given IM. As with other benzodiazepines, there is no analgesia seen with administration of this drug but has very pronounced amnesic properties.

Indications:

Versed is used for premedication in painful procedures such as cardioversion. It is also used regularly for sedation in intubated patients.

Contraindications:

Any patient with documented hypersensitivity should not receive this product. Patients with narrow angle glaucoma are also not candidates for the use of this drug. In addition, those patients in shock, with depressed vital signs, or in alcoholic coma should not be given this drug.

Dosage:

Intravenous dose is 1 to 2.5 mg diluted in normal saline or D₅W given slowly to achieve the sedation needed. Versed given intramuscularly is administered at a dose of 0.07 to 0.08 mg/kg. (average adult dose is 5 mg)

Adverse Reactions:

Adverse reactions that can be seen with the administration of Midazolam include amnesia, altered mental status, drowsiness, dyspnea, respiratory depression, broncho- and laryngospasm, and cardiac abnormalities.

Precautions:

Vital signs should be monitored regularly during administration of this drug as respiratory depression and cardiac abnormalities may be seen. Central Nervous System depressants such as narcotics and alcohol can increase the action of Midazolam.

N. HALOPERIDOL (HALDOL)

Class:

Antipsychotic and neuroleptic

Mechanism of Action:

Haloperidol is a tranquilizer that is used in the management of those patients suffering from acute psychotic episodes. Haloperidol is given to block the dopamine receptors in the brain that are associated with behavior and mood. Haloperidol also has some minor anticholinergic effects.

Indications:

This drug is used to treat acute psychotic episodes

Contraindications:

Haloperidol should not be used in the presence of other sedatives. Haloperidol also should not be used in conjunction with Talwin as it may potentiate the action of this drug.

Dosage:

Haloperidol should be given intramuscularly only. The normal dose range is 2 to 5 mg for acute psychotic episodes.

Adverse Reactions:

Haloperidol may produce respiratory depression, hypotension, tachycardia, seizures, insomnia, restlessness, drowsiness, dry mouth and constipation.

Precautions:

Haloperidol may impair both mental and physical abilities. This drug can elicit an orthostatic change in vital signs. It should be used with caution in those patients receiving anti-coagulation therapy. Haloperidol should be used with caution when given to patients taking lithium as brain damage caused by encephalopathic syndrome may be seen. Dystonic and extrapyramidal reactions have been seen with Haloperidol administration, especially in children. Diphenhydramine (Benadryl) should be readily available.

O. TOTAL PARENTERAL NUTRITION (TPN)

Class:

Nutritional Supplement

Mechanism of Action:

This supplement is used to give the body needed nutrition and other elements when the patient is unable to take this nutrition orally. TPN is traditionally supplied in either a 2:1 or 3:1 mixture. The 2:1 mixture will contain dextrose and protein/amino acids solutions. The 3:1 solution will include these elements and plus a lipid mixture. The 2:1 solution will be clear and the 3:1 solution will normally be cloudy. Other additives commonly seen in a TPN solution include any of the following: multi-vitamins, electrolytes, acid blockers such as Pepcid or

TOTAL PARENTERAL NUTRITION (TPN)(CONT.)

Zantac, insulin and trace elements.

Indications:

This supplement is used to supply nutrition when patients are unable to take food or fluids by mouth.

Contraindications:

None

Dosage:

Dosage is normally based on patient weight and these solutions are normally given continuously over the patient's hospital stay.

Adverse Reactions:

Patients receiving insulin as a part of their TPN solution may experience hypoglycemia if not monitored closely.

Precautions:

All patients who have insulin as a part of their TPN solution should have blood sugar analysis done periodically. Most of these solutions are given through central venous access devices and these devices should be monitored closely for signs of problems.

Transport Considerations

Check the IV site – patency, redness etc.

IV fluids / medications running into the same site

Check for a copy of the order for the TPN

Check concentration

Check the dose

Why was the drip started?

When was the drip started?

Last time the drip was titrated & why?

P. H2-Blockers: Intravenous Famotidine (Pepcid) as an example.

Indications:

Active duodenal ulcer, active benign gastric ulcer, GERD, pathologic hypersecretory syndromes such as Zollinger-Ellison syndrome, or Upper GI bleeding without good control.

Mechanism of Action:

Competitive inhibitor of histamine H₂-receptors. This competitive inhibition decreases gastric secretion.

Dosage and Administration:

Adults is 20 mg IV every 12 hours and Pediatrics is 0.25 mg/kg IV every 12 hours up to the adult dose for those greater than 1 year of age. To prepare injection,

H2 Blockers (Intravenous Famotidine)(CONT.)

aseptically dilute 2 cc of famotidine injection with 0.9% NaCl, D5W, or LR solution to a total volume of 5 cc or 10 cc and inject over 2 minutes. Infusion solution is 2 cc of famotidine in 100 cc of D5W, 0.9% NaCl, or LR solution, and infuse over 15-30 minutes. These solutions are stable for 7 days at room temperature.

Considerations:

It is mainly metabolized through the Kidneys. There are no significant drug-drug interactions. It is appropriate in pediatric patients greater than one year of age.

Contraindications:

Hypersensitivity to any components of this product or report of hypersensitivity to other histamine H2-antagonists.

Precautions:

No significant neurologic, cardiac, respiratory or ophthalmologic contraindications exist. Use of famotidine or any other antihistamine can cause neurologic changes (mental status changes) in the elderly. As well, myelosuppression may occur. Although no dosage decrease is advocated in initiating treatment, those with decreased renal function will have more persistent drug serum levels and perhaps lower serial doses or spacing out interval of dosing may be necessary.

Transport Considerations

Check the IV site – patency, redness etc.

IV fluids / medications running into the same site

Check for a copy of the order for the H2 Blocker

Check concentration

Check the dose

Why was the drip started?

When was the drip started?

Last time the drip was titrated & why?

Q. Proton Pump Inhibitors: Intravenous Pantoprazole (Protonix) as an example.

Indications:

Erosive esophagitis (upper GI bleed with uncertain etiology also qualifies) or pathologic hypersecretory syndromes such as Zollinger-Ellison Syndrome.

Mechanism of Action:

Pantoprazole inhibits the last enzyme in the enzymatic cascade for secretion of hydrochloric acid in the parietal cell. This action lasts for more than 24 hours.

Dosage and Administration:

Adult dose is 40 mg IV once daily for Upper GI Bleeding and 80 mg IV twice daily in those with pathologic hypersecretory conditions. Administer reconstituted formula through in-line filter in dedicated line. Forty milligrams (40 mg) should be reconstituted in 10 cc of 0.9% NaCl, then further dilution (admix) with 100 cc

Proton Pump Inhibitors (Intravenous Pantoprazole))(CONT.)

of D₅W, 0.9% NaCl, or LR, to a final concentration of approximately 0.4 mg/ml. The reconstituted formula may be stored for up to 2 hours at room temperature; the admixture may be stored up to 12 hours at room temperature. Light protection is not necessary. Administer over 15 minutes at a rate not greater than 3 mg/minutes (7 cc/minute).

Considerations:

Not investigated in patients under 18 years of age. There are no known Drug-Drug Interactions except for potential absorption differences in drugs that are pH dependent for oral absorption. The drug is metabolized via the liver and the cytochrome P450 system.

Contraindications:

If patient has known hypersensitivity to the formula.

Precautions:

No significant neurologic, cardiac, respiratory or ophthalmologic contraindications exist.

Transport Considerations

Check the IV site – patency, redness etc.

IV fluids / medications running into the same site

Check for a copy of the order for the Medication

Check concentration

Check the dose

Why was the drip started?

When was the drip started?

Last time the drip was titrated & why?

R. Somatostatin Analogues: Intravenous Octreotide (Sandostatin) as an example.

Indications:

Esophageal varices that are bleeding, acromegaly, carcinoid tumors, and Vasoactive Intestinal Peptide tumors (VIPomas).

Mechanism of Action:

Similar to Somatostatin, with inhibition of growth hormone, glucagon, insulin, LH response to GnRH, serotonin, gastrin, vasoactive intestinal peptide, secretin, and motilin. It also inhibits gallbladder contractility, and suppresses TSH.

Dosage and Administration:

Most commonly used in emergency medicine for variceal bleeding. Give 50 mcg IV bolus followed by 25-mcg/hr IV drip.

Considerations:

It is metabolized by the kidneys. Limited pediatric data but it has been used on a

Somatostatin Analogues (Intravenous Octreotide)(CONT.)

one month old, dose is 1-10 mcg/kg. Drug-Drug Interactions: May interact with cyclosporine; patients on insulin, oral hypoglycemics, beta blockers, calcium channel blockers, diuretics or electrolyte supplements may need medication adjustments.

Contraindications:

Sensitivity to this drug or any of its components.

Precautions:

The many actions of Octreotide have its most profound potential effects in regards to serum glucose and cardiac conduction. Monitor blood glucose and have the patient on the cardiac monitor when infusing this medication. Pancreatitis and cholecystitis may result from use of this drug.

Transport Considerations

Check the IV site – patency, redness etc.

IV fluids / medications running into the same site

Check for a copy of the order for the Medication

Check concentration

Check the dose

Why was the drip started?

When was the drip started?

Last time the drip was titrated & why?

VII. Pumps

Didactic

Instructor should list types of pumps that will be used by the service when transferring patients. Instructor should demonstrate how to:

Turn pumps on/off

Set infusion rates

Set up the pump

Reset the pump

Troubleshoot the pump

Correct operating procedure for specific pumps

Instructor should also discuss the specifications for the pump, including power source and battery life.

* Note; it will be helpful to have manufacturers product material for this part of the program.

VIII. Practical

Discuss with the student's situations where patients might be considered clinically unstable, necessitating that appropriate hospital personnel accompany the patient during

transport. Focus on the need for the paramedics to get a thorough and complete history and course of action from the hospital staff prior to leaving. Refresh assessment highlights for patients in the following categories: cardiac, trauma, pulmonary decompensation, overdoses.

Instructor should set aside appropriate practical time for the students to work with each of the pumps to accomplish the objectives. Additional clinical time may be necessary to accomplish this task. Instructor should also have students perform drills with adverse reaction scenarios.

PARAMEDIC INTERFACILITY TRANSPORT MEDICATION CHECKLIST FOR CONTINUOUS INFUSIONS

Dobutamine

Check the IV site – patency, redness etc.
IV fluids / medications running into the same site
Check for a copy of the order for the Dobutamine
Check concentration
Check the dose
Why was the drip started?
When was the drip started?
Last time the drip was titrated & why?

Incompatible with the following medications if given via same IV line:
Furosemide, Sodium Bicarb, Potassium

Compatible with: Dopamine, Lidocaine, and Potassium

Heparin

Check the IV site – patency, redness etc.
IV fluids / medications running into the same site
Check for a copy of the order for the Heparin
Check concentration
Check the dose
Why was the drip started?
When was the drip started?
Last time the drip was titrated & why?
Signs & symptoms of any bleeding
Avoid unnecessary IV sticks

Incompatible with the following medication if given via same IV line:
Diazepam (Valium)

Nitroglycerin

Check the IV site – patency, redness etc.
IV fluids / medications running into the same site
Check for a copy of the order for the NTG
Check concentration
Check the dose
Why was the drip started?
When was the drip started?
Last time the drip was titrated & why?
Ask about Viagra use!
Beware of Orthostatic Hypotension with Calcium channel blockers
Headache can be relieved with analgesics

PARAMEDIC INTERFACILITY TRANSPORT MEDICATION CHECKLIST FOR CONTINUOUS INFUSIONS

Potassium

Check the IV site – patency, redness etc.
IV fluids / medications running into the same site
Check for a copy of the order for the Potassium
Check concentration
Check the dose
Why was the drip started?
When was the drip started?
When was the last Potassium level done & value (Norm 4 – 5.4 mEq /L)
Replacement Therapy
PIV - maximum concentration 10 mEq / 100 cc every hour
Central Line – maximum concentration 20 mEq / 50 cc
Aware of any illness/injury causing retention of potassium

Incompatible with the following medication if given via same IV line:

Diazepam (Valium)

Glycoprotein IIb / IIIa Inhibitors (Aggrastat)

Check the IV site – patency, redness etc.
IV fluids / medications running into the same site
Check for a copy of the order for the IIb / IIIa medication
Check concentration
Check the dose
Why was the drip started?
When was the drip started?
Last time the drip was titrated & why?
Signs & symptoms of any bleeding
Avoid unnecessary IV sticks

Incompatible with the following medication if given via same IV line:

Diazepam (Valium)

Anti – Infective Drugs

Check the IV site – patency, redness etc.
IV fluids / medications running into the same site
Check for a copy of the order for medication
Check concentration
Check the dose & dosing schedule
Why is the medication being given?
The first dose of any Anti – Infective Drug should be given in the hospital if possible.
The Aminoglycoside class (Gent, Tobramycin, and Vancomycin) should be given slowly, usually over 1 hour – because of nephro toxicity.

PARAMEDIC INTERFACILITY TRANSPORT MEDICATION CHECKLIST FOR CONTINUOUS INFUSIONS

Procainamide (Pronestyl)

Check the IV site – patency, redness etc.
IV fluids / medications running into the same site
Check for a copy of the order for Procainamide
Check concentration
Check the dose
Why was the drip started?
When was the drip started?
Last time the drip was titrated & why?

Hypotensive effects of procainamide may be enhanced in the presence of antihypertensive medications.

Diltiazem (Cardizem)

Check the IV site – patency, redness etc.
IV fluids / medications running into the same site
Check for a copy of the order for Diltiazem
Check concentration
Check the dose
Why was the drip started?
When was the drip started?
Last time the drip was titrated & why?

May produce hypotension so constant blood pressure monitoring is essential.

Insulin (Humulin, Novolin, Iletin)

Check the IV site – patency, redness etc.
IV fluids / medications running into the same site
Check for a copy of the order for the Insulin
Check concentration
Check the dose
Why was the drip started?
When was the drip started?
Last time the drip was titrated & why?

Constant blood glucose monitoring is essential.

PARAMEDIC INTERFACILITY TRANSPORT MEDICATION CHECKLIST FOR CONTINUOUS INFUSIONS

Total Parenteral Nutrition (TPN)

Check the IV site – patency, redness etc.
IV fluids / medications running into the same site
Check for a copy of the order for the TPN
Check concentration
Check the dose
Why was the drip started?
When was the drip started?
Last time the drip was titrated & why?

*Patient should have blood sugar analysis done periodically.
Central line devices monitored closely for signs of problems.*

SAMPLE

Guidelines for Paramedic Transfer

1. If a patient has received a thrombolytic agent, transport is to take place NO sooner than **one hour** after completion of administration and may require the accompaniment of a Registered Nurse.
2. The following will require Registered Nurse accompaniment:
 - a. Any patient having life threatening, unstable¹, dysrhythmias.
 - b. Any patient who has uncontrolled pain² despite treatment.
 - c. Any patient who is hemodynamically unstable³.
 - d. Any patient with infusions, *other than the following*, currently running:

| | |
|------------------------------|----------------------------------|
| Antibiotics | Morphine |
| Diltiazem (Cardizem) | Nitroglycerine |
| Dobutamine | Potassium |
| Dopamine | Procainamide (Pronestyl) |
| Glycoprotein IIb/IIIa Inhib. | Proton Pump Inhibitors |
| Heparin | Somatostatin Analogues |
| H2 Blockers | Total Parenteral Nutrition (TPN) |
| Insulin | Vitamins |
| Lidocaine | |
 - e. Any patient requiring the administration of PO, SL, IV bolus, SC, IM, UDN, or MDI medications *other than the following*:

| | |
|----------------------|--|
| Adenosine | Lidocaine |
| Albuterol | Lorazepam (supplied by sending facility) |
| ASA | Magnesium Sulfate (cardiac arrhythmia's only) |
| Atropine | Meperidine |
| Dextrose | Midazolam (Versed)(supplied by sending facility) |
| Diazepam | Morphine |
| Diphenhydramine | Naloxone |
| Epinephrine | Promethazine |
| Furosemide | Sodium Bicarbonate |
| Glucagon | Nitroglycerine |
| Haloperidol (Haldol) | Thiamine |
3. Registered Nurse accompaniment will always be welcome if deemed advisable by the attending physician and/or the patient's nursing staff. The patient's best interest is the final determining factor.

¹ **Unstable:** recurrent chest pain or hemodynamically unstable.

² **Uncontrolled pain:** incomplete relief of pain by medications or treatment.

³ **Hemodynamically unstable:**

- a. Having signs and symptoms of decreased cardiac output (i.e. decreased blood pressure, pain, diaphoresis, dyspnea, decreased sensorium)
- b. Any patient who requires *multiple* intravenous drips to maintain blood pressure, control pain, and/or control hemodynamic stability.